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**Transport Container System for Goods, Especially for Fruits and Vegetables****Background of the Invention**

The present invention relates to a transport container system, in particular for goods, that has a stackable transport container, preferably a crate. The stackable transport container can be foldable or non-foldable. Such crates are known and are used in particular for transporting goods such as fruits and vegetables. In the framework of this invention, goods are understood to be units of goods to be transported comprising individual items with a size of at least 0.5 – 1.0 cm.

The foldable and non-foldable transport containers that are already known for fruits and vegetables comprise cardboard, wood, or plastic. The foldable transport containers are characterized in that their lateral wall parts can be moved against the interior bottom of the transport container, this achieving a decrease in the volume of the transport container when it is empty. When unfolded, the lateral wall parts are at a 90° angle to the interior bottom and are detachably engageable with one another using various means. While the bottom of the non-foldable or of the foldable transport container has a defined size, there are containers with lateral wall parts of different heights for attaining different transport volumes, whereby two or four lateral wall parts have the same height. Furthermore, the lateral wall parts have on the upper side facing away from the bottom a profile or an apparatus that renders the transport

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container stackable. The transport containers preferably have corner stiffeners for increasing the stability of the non-foldable and foldable transport containers, in particular with respect to stackability. The previously known transport containers have a maximum volume capacity that is determined by the size of the bottom and  
5 the height of the lateral wall parts. When larger volume capacities are required for the transport containers, the transport containers must be provided with other, higher lateral wall parts. Thus, rapid adaptation of the volume capacity of the transport containers to changing user requirements is only conditionally provided.

The size of certain types of fruits and vegetables varies from season to season,  
10 depending on different factors for instance during the growth period. The size of the fruits and vegetables to be packed is established by regulations of the European Community. One known problem during transport of goods such as fruits and vegetables thus results from the varying size of the goods to be transported for optimum filling of transport containers. In order to be able to take into account  
15 varying requirements for goods, the transport containers, in particular crates, are machine-manufactured in specific sizes that can also be specified by the production facility or can be established by the selection of the production parameters. It is therefore not possible to rapidly change the size of the transport container and thus its volume capacity in the sense of optimum filling depending on the size of the  
20 goods without major logistical transport problems occurring or a complex change in

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the production facility and associated high costs.

The problem cited in the foregoing particularly occurs with the known transport containers when cardboard packages that are comparatively simple to produce and that are for the transport of goods such as fruits and vegetables are replaced by more environmentally-friendly reusable containers that are made of plastic or a similar material suitable for this use but that are also expensive to produce. For the known reusable containers made of plastic, optimum adaptation of the transport containers to the size of the goods to be transported proves to be particularly complex and difficult. In order to attain maximum use of transport apparatus, the transport containers are stackable so that a plurality of these containers can be transported in containers, on loading beds of trucks, in freight trains, or on similar transport apparatus. The item to be transported must not project out over the upper edge of the transport container, since then the transport container would no longer be stackable and/or the item would be damaged. What this results in is that the volume capacity of the known transport containers in many cases cannot be used optimally.

Applicant's reusable transport containers, which are called "round trip containers" in the industry, are available in approximately ten different embodiments that are distinguished by the height of the lateral wall parts. The height of the lateral wall parts varies from 8 to 28 cm, whereby preferably used are heights of 8, 10, 13, 15, 16,

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18, 20, and 23 cm. The bottom of these transport containers is preferably rectangular and has an exterior dimension of 600 mm x 400 mm. This means it corresponds to the bottom dimensions of standardized EURO and US palettes.

5 The object of the present invention is to design a transport container system such that it is possible to rapidly and variably adapt the volume capacity of transport containers to the varying sizes of the goods to be transported and thus optimum filling of the transport containers is possible.

### Summary of the Invention

10 One inventive transport container system is distinguished by a stackable transport container, in particular a crate, that comprises a bottom and four lateral wall parts that are structured to be stable under pressure. The stackable transport container is foldable or non-foldable. Furthermore, the transport container system includes a top or extender that makes it possible to enlarge the volume capacity of the transport container. The top itself comprises four lateral wall parts that are placed in a shape-  
15 conforming manner over the crate opening and is produced from cardboard, plastic, wood or a similar suitably stable material. These materials can advantageously be provided with an impression, labeling, or another marking that preferably facilitates recognition, registration, or particularly preferred advertising purposes. One special advantage results from the production of the tops from natural products such as for

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instance wood or cardboard that make it possible to dispose of the tops at the delivery site for the goods, so that there are no costs for returning the tops to the selling location.

Another advantage of the invention results from the fact that the lateral wall parts of the tops can be produced with different heights, so that the volume capacity of the transport container is optimally adapted to the variable size of the goods to be transported, in particular fruits and vegetables. The height of the lateral wall parts of the top is preferably 2 - 8 cm, particularly preferred 3 - 5 cm. At least two approximately parallel lateral wall parts preferably have the same height; particularly preferred all four lateral wall parts are equal in height.

The lateral wall parts of the top that conform in shape to the transport container can preferably detachably engage with the transport container using fastening means. The fastening means are preferably attached to and can detachably engage with the top and transport container. It is particularly preferred that the top or the transport container has a fastening means that detachably engages with the transport container or the top. The top preferably locks to an area of the lateral wall part or bottom of the transport container. Suitable for fastening means are in particular all means that provide a detachably engageable connection between transport container and top such as eyes, hooks, screw connections, etc. The transport container and the top are

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preferably detachably engageable using external fastening means that are not permanently attached to the transport container system, such as clamps, clips, etc. These fastening means advantageously prevent the top from being displaced relative to the transport container so that the goods contained in the transport container systems are not damaged. Another advantage of detachable engagement of the top with the transport container is that the top can be removed from the transport container with no problem at the destination site for the goods to be transported and thus there is a decrease in volume for the emptied transport container. This is particularly advantageous when using reusable transport containers.

The wall strength of the lateral wall parts of the top is preferably selected such that the transport container systems filled with the goods to be transported are stackable. The stackability of the transport container systems is preferably promoted by four lateral wall parts of the top that have the same height and that in particular it can detachably engage with the transport container and particularly preferred by a profile on the upper side of the top that preferably conforms with a profile or auxiliary profile on the underside of the bottom of the transport container. The profiles of top and transport container advantageously facilitate stacking the transport container systems and prevent the systems from shifting during transport. Therefore additional securing of the preferably stacked transport container systems is not necessary during

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transport. This contributes advantageously to maximum utilization of the volume of transport apparatus without damaging the goods to be transported.

5 The top can preferably be collapsed to a narrow strip, in particular using folding sites at the four corner edges. One advantage is the low transport volume of tops that have been folded up, which facilitates optimum use of transport means since the tops frequently have to be transported across great distances to the packaging areas for the goods, in particular harvesting regions for fruits and vegetables, and in the case of reusable tops back to the selling locations.

10 The frame-shaped top preferably has corner stiffeners for increasing stability. An increase in stability is furthermore attained in particular in that the top comprises one piece and is created by connecting the free ends of a band-shaped lateral wall part or particularly preferred is embodied as an extrusion profile. Alternatively, the frame-shaped top is formed by connecting the free ends of individually produced lateral wall parts.

15 Additional application options and advantages of the present invention result from the following description with respect to the drawings.

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**Brief Description of the Drawings**

- Fig. 1a: is a perspective elevation of one embodiment of the inventive transport container system;
- Fig. 1b: is a schematic representation of the foldable transport container and the foldable top;
- Fig. 2: is a perspective of a profile-conforming top;
- Fig. 3a: is an exemplary embodiment of a fastening means attached to the top;
- Fig. 3b: is an exemplary embodiment of a fastening means attached to the transport container;
- Fig. 4a: illustrates the top when folded;
- Fig. 4b illustrates the top in frame shape with corner stiffeners;
- Fig. 5: is a perspective elevation of a profile-conforming top;
- Fig. 5a: is a view of a longitudinal side of a profile-conforming top with fastening means;
- Fig. 5b: is a view of a transverse side of a profile-conforming top with fastening means.



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### Detailed Description of the Invention

Fig. 1a is a perspective representation of an embodiment of an inventive transport container system 10. The transport container system 10 illustrated in Fig. 1a comprises a non-foldable or foldable transport container 20 and a top 30. The transport container 20 of the inventive transport container system 10 has a rectangular bottom 13 and two largely parallel lateral wall parts 11 and 11a as well as two largely parallel lateral walls 12 and 12a. The lateral wall parts 11, 11a, 12, 12a are foldable relative to the interior surface of the bottom 13 of the transport container 20, as illustrated in Fig. 1b.

Fig. 1a illustrates a non-foldable or the unfolded condition of a foldable transport container 20, whereby the lateral wall parts 11, 11a, 12, 12a are at a 90° angle to the interior surface of the bottom 13 of the transport container 20. In the upper area the two lateral wall parts 12 and 12a have handle recesses 14, 14a that facilitate ease of transport for the transport container system. Such handle recesses 14, 14a are also conceivable in the two lateral wall parts 11 and 11a; however these are not shown for reasons of greater clarity. Furthermore, Fig. 1a illustrates the frame-shaped top 30, which is placed on the lateral walls 11, 11a, 12, 12a in a shape-conforming manner. The top 30, which conforms to the transport container 20, likewise comprises two largely parallel lateral wall parts 15 and 15a and two largely parallel lateral wall parts 16 and 16a. As shown in Fig. 1a, the lateral wall parts 11, 11a, 12, 12a of the

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transport container 20 are preferably equal in height, as are the lateral wall parts 15, 15a, 16, 16a of the top 30, whereby the height of the lateral wall parts of the top 30 and of the transport container 20 are preferably different.

The lateral wall parts 11, 11a, 12, 12a of the transport container terminate in a straight line in the wall area opposing the bottom 13, as illustrated in Fig. 1a, or have a profile 21, as illustrated in Figs. 2, 5, 5a, and 5b. The same applies for the bottom 13 of the transport container 20. In Fig. 1a the bottom 13 is embodied in a straight line, while Figs. 2, 5, 5a, and 5b show a profile 22 on the underside of the bottom 13 of the transport container 20. As can be seen in Figs. 1a, 2, 5, 5a, and 5b, the profile 31 of the top 30 conforms to the lateral wall parts 11, 11a, 12, 12a, and the bottom 13 of the transport container 20. Preferably the top 30 includes fastening means 32 that are produced from the material of the top 30 and that detachably engage with the preferably lattice-structured lateral wall parts 11, 11a, 12, 12a of the transport container 20 (Figs. 2, 3a, 5, 5a, and 5b). A lattice structure of the external wall surfaces, which increases stability of the walls under pressure, is not illustrated in order that the drawings be clear and simple. The fastening means 32 can be produced from any other material than the top or the transport container. Preferably the transport container 20 or the top 30 has a counterpiece 23 to the fastening means 32 with which the fastening means 32 detachably engage. Particularly preferred, the fastening means 32 are attached to the top 30 and detachably engage with the lateral

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wall parts 11, 11a, 12, 12a or the bottom 13 of the transport container 20. In another embodiment (Fig. 3b), the fastening means are joined to the transport container 20 and detachably engage with the lateral wall parts 15, 15a, 16, 16a of the top 30.

Fig. 3a illustrates fastening means 32 that are attached to the top 30 and that detachably engage with the lateral wall surface of the transport container 20. In this exemplary embodiment, a hook-shaped fastening means is illustrated that detachably engages in the lattice structure of the wall surface of the transport container 20. The profile-conforming design of the top 30 as illustrated in Fig. 2, as well as the manner in which the top 30 detachably engages with the transport container 20 using fastening means 32, facilitates the advantageous stackability of the transport container systems 10.

Fig. 4a illustrates the inventive top 30 when folded. The top 30 can assume two different physical shapes, either collapsed to save room for transport to the site at which the top 30 will be used (Fig 4a) or unfolded in the frame-shaped embodiment (Fig. 4b) in which the top 30 is a component of the transport container system.

The embodiments illustrated in Figs. 4b and 5 have fold lines 18 in the corner areas of the top 30 that facilitate folding the top 30. Once folded, the lateral wall 15 of the top 30 borders on the lateral wall 16 and comes in contact with the lateral walls 16a

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and 15a. Corner stiffeners 17 promote the stability of the top 30 when the top 30 is in the unfolded frame-shape. These corner stiffeners 17 are preferably attached in all four corners.

Fig. 1b and Fig. 4a illustrate that in addition to the top 30, the transport container 20 of the transport container system 10 also comes in two physical shapes. So that the transport container system 10 is present in the optimum space-saving shape for use during transport, the top 30 is removed from the transport container 20 and the top 30 and the transport container 20 are placed in the folded or collapsed condition. At the utilization site for the transport container system 10, the top is unfolded, the foldable transport container 20 is opened up, and the top 30 is detachably engaged with the non-foldable or foldable transport container 20. The top 30 now leads to the desired enlargement of the volume capacity of the transport container 20, this providing optimum utilization of the volume capacity of the transport container 20. The height for the top that is available in different heights at the utilization site can be selected that ensures optimum filling of the transport container system 10 given some non-optimum size of the transport container 20 present.

Fig. 5 illustrates another exemplary embodiment of an inventive top, whereby only one fastening means 32 is attached to each of the sides 15, 15a, 16, 16a. As Figs. 5a and 5b illustrate, each of the fastening means is attached in the center of the sides 15,

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15a and/or 16, 16a.